

account of the habits and appearance of the larger fauna, which is so plentiful that no expedition need suffer from want of food; the geology of the coast and islands was well investigated, and coal was found to abound in some districts; dredging also was occasionally carried on, but with no very fruitful results. Clavering, forty years ago, met with a considerable number of natives in this part of East Greenland; not one is now to be found, though the remains of their huts, burial-places, weapons, and utensils abound. The map shows that careful and frequent soundings were taken, and the book contains some very valuable observations on the nature of the ice of these regions, and especially on the difference between the Greenland glaciers and those of the Alps. We find also that a spectroscopic examination was made of the deep blue light of the ice, the result of which is, however, not given. Indeed, those who want to obtain full details of the scientific results of this expedition must go to the original German account, as the English edition has evidently been mainly abridged by the omission of scientific details.

Altogether, the results of the second German Arctic Expedition are such as to reflect the very highest credit upon its members, and must be very gratifying to its promoters. There is yet much to be done ere the east coast of Greenland is adequately explored, and although this expedition has clearly proved that there is no road to the pole from that side, still there is undoubtedly on the east coast of Greenland a fertile field for further discovery. All this is admitted by Capt. Koldewey in his conclusion, and we coincide with him in believing that if an English expedition to West Greenland through Smith's Sound, and a German one to East Greenland, started at the same time, they would, with our present experience and means of assistance, certainly lead to very rich results. Happily, an English expedition on an adequate scale is being organised; let the German Government emulate the liberality of ours, and send out an equally well-equipped expedition, to continue, if not to complete, the work of the *Germania* on the other side of Greenland. If it so please the Germans, let it be a race to the pole, and let Dr. Petermann be umpire.

The *Germania* left her winter-quarters on July 22, and after coasting about for some time—it was then the large Fjord was discovered—turned homewards, and reached Bremerhaven safely on Sept. 11.

The translation and editing are carefully done, and the numerous and well-executed illustrations add greatly to the value of the work, which well deserves a wide circulation.

DRAYSON'S "PROPER MOTION OF THE FIXED STARS," ETC.

The Cause of the Supposed Proper Motion of the Fixed Stars, and an Explanation of the Apparent Acceleration of the Moon's Mean Motion; with other Geometrical Problems in Astronomy hitherto Unsolved. A Sequel to the Glacial Epoch. By Lieut.-Col. Drayson, R.A., F.R.A.S. (London: Chapman and Hall, 1874.)

THIS book, the author tells us, is a sequel to "The Cause, Date, and Duration of the Last Glacial Epoch," of which we published a short notice last year. The last work was founded on misconception and igno-

rance, and in this respect the one may fairly be called a sequel to the other. In our remarks on "The Glacial Epoch" we objected to the author's attempt to solve a problem in physical astronomy by geometry alone. The author, however, is unconvinced. His geometry, it is true, is a much more powerful instrument than anything of the same name which we have had the fortune to meet with so far. On p. 4 of the present work he thus compares the powers of observation and geometry:—"Mere observation can never arrive at any result until the whole cycle, and perhaps many cycles, have been observed. For example, if the sun's mid-day altitude were observed on the 1st of January of any year, and again on the 1st of February and 1st of March, observation alone could tell us nothing more than that there was a certain increase in this meridian altitude. Geometry, however, could analyse this rate of increase, and would probably be able to predict what would be the sun's meridian altitude for every day in the year." Perhaps the author could, by his geometry, if he knew the height of the reviewer at the ages of ten, twelve, and fourteen, predict his height at the age of fifty or sixty. The geometry which could solve the one problem would surely be able to solve the other.

Lieut.-Col. Drayson is not only unconvinced; he is unblushingly self-confident. On p. 33 we find: "When, then, it happens that the number of persons capable of judging independently of an original and difficult problem in geometrical astronomy, are to the number who are the mere blind followers of 'authorities in science' as about one to ten thousand, we find ourselves in a considerable minority."

On the other hand, the amount of reliance which he places upon the intelligence of other persons is very slight, as may be seen from the following quotations:—

"To a person unacquainted with geometry there seems nothing unsound in stating that the centre of a circle can vary its distance from the circumference and yet still always remain the centre; and this is the statement now put forward as correct by certain theorists."

"In our work, 'The Cause, &c., of the Glacial Epoch,' we called attention to the fact that it seemed improbable that the centre of a circle could vary its distance from its circumference and yet remain the centre, although it had been agreed during nearly two hundred years that it could do so."

Of course it would seem unsound, improbable, impossible, and absurd to anyone who had formed his ideas of a circle from Euclid's definition; and to us it seems almost inconceivable that anyone can really believe or profess to believe, what the author here and in almost innumerable other passages in his books so confidently asserts, that this absurdity is taught or even thought of. The author certainly never proves that such is the case. The special views of Lieut.-Col. Drayson with reference to the movement of the axis of the earth in space we will let him state for himself:—

"It is here demonstrated that during 230 years we can calculate what the obliquity was to within one second; that is to say, the actual curve traced by the pole of the heavens relative to the pole of the ecliptic during 230 years does not differ one second from the circumference of a circle having a radius of $29^{\circ} 25' 47''$, and its centre 6° from the pole of the ecliptic. In other words, the curve traced by the pole of the heavens during 230 years is part of a circle such as that defined above."

On the previous page we find his opinion of his own exploit, for he there tells us: "This calculation is, perhaps, the most rigid geometrical investigation that has ever been applied to an astronomical problem."

Perhaps our readers will scarcely credit the statement that, notwithstanding this proud confident boasting, there is no *investigation* at all. All the author does is to draw a circle, which of course he can draw through three points, which are different positions of the earth's pole, and then, because his circle always passes within one second of the different positions of the pole for a couple of hundred years, we are asked to take it as proved that the pole always has been and always must be on this circle.

The extreme proximity of two curves for a comparatively short distance is no criterion of their being coincident.

The author, in the preface to this work, makes some strictures on our remarks on "The Glacial Epoch." In these he mistakes our illustrations for arguments, misquotes our objections, and misstates our arguments. It is impossible to reply, and it is perhaps as well; we have already given too much space to this author.

OUR BOOK SHELF

Degli Studi Fisici di Ambrogio Fusinieri: Commemorazione per Enrico dal Pozzo di Mombello, Professore di Fisica nell' Università Libera di Perugia. (Foligno, 1874.)

THIS dry little book gives an account of the works of Fusinieri which related chiefly to endosmose, capillarity, adhesion, and other molecular actions; also to static electricity and to magnetism. He published a work in 1844 on "Molecular Mechanics, and a Repulsive Force in the Ethereal Medium," which we have never seen, but which would surely be of interest now in connection with Mr. Crookes's experiments on repulsion by heat in a vacuum; in 1846, a memoir on Light, Heat, Electricity, Magnetism, and Electro-magnetism; in the following year a memoir on Meteorology; and altogether many small occasional memoirs. The second part of Prof. dal Pozzo's works is a critical inquiry into the work entitled "The Unity of the Physical Forces," published in 1864 in Rome by Father Secchi; and the third part contains some biographical notices of Fusinieri. The book is unillustrated, and has no felicities of style to recommend it; the students of the Free University of Perugia must be devoted scientists if they purchase the book and manage to read from beginning to end of it.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

Royal Agricultural Society and the Potato Disease

THE paragraph which appeared in your last week's issue is so far interesting that it amply confirms the expectations of those who have watched the well-meant efforts of the Royal Agricultural Society with respect to the potato disease. I wish to advert to it for two reasons. In the first place, it is interesting to see the way in which a matter of this kind is regarded by so influential a body. Here is a disease annually effecting the destruction of a larger or smaller part of a chief item in the food of the community, which has already produced a famine in one of the three kingdoms, and any year may produce another, and which for the last thirty years has seriously occupied the atten-

tion of scientific men throughout Europe. Is it not surprising that the Royal Agricultural Society should think the offer of a 100*l.* prize for an essay in any way an adequate method of dealing with the subject? In the first instance, the time for sending in the essays was actually fixed so as to prevent the competitors from even going over the life history of the fungus during one season before competing. This was pointed out, and the time was prolonged. But though the competition was advertised abroad in the German papers, nothing of any importance was elicited beyond what was already well known.

The Society then determined to offer prizes for disease-proof potatoes. The utter futility of this proceeding was clearly obvious to anyone in the least acquainted with the subject. But it was done, and possibly if the "botanic referee" liked travelling about the three kingdoms, his time was not wasted. But the result is exactly what it was predicted it would be.

Now, it seems to me that this spasmodic and ill-considered way of dealing with a serious subject contrasts, to an extent that it is impossible quite to regard with satisfaction, with the course that would be adopted in such a matter in other countries. It shows, at any rate, how little the methodical scientific method of investigation is understood by the majority of well-informed English people.

And this brings me to my second point. The Society, anxious not to be entirely foiled, offered a sum of money to a well-known investigator of the life history of fungi, Prof. de Bary, of Strasburg, to induce him to study the potato disease. Considering that De Bary had already written an admirable memoir on the *Peronospora*, there was a certain simplicity in supposing that the gift of a sum of money would elicit some additional information which his zeal as a scientific investigator had failed to do. If it does, however (and the history of the *Peronospora infestans* is not perfectly understood), it will be a clear gain; but when we are told that "Prof. de Bary has worked out the scientific questions that occur as to the origin of the disease," and that "it is owing to a fungus (*Peronospora infestans*) which attacks the leaves first, and after absorbing the nutriment of them, utilises the petiole, and thus reaches the tubes" (*sic*), it is necessary to point out that all this and a good deal more was ascertained by the Rev. M. J. Berkeley in this country, and by Montagne in France, and published by the former in a paper contributed to the first volume of the *Journal of the Horticultural Society* in 1846.

Nov. 20

W. T. THISELTON DYER

Zoological Gardens, Regent's Park

HAVING lately visited some of the Zoological Gardens on the Continent, and on my return compared those in the Regent's Park with the recollection of the former, I have been impressed that the latter appear to stand in need of much improvement.

In the first place, to adapt them to modern ideas of sanitary science, we should consider they are much *too small in area* for the number of inhabitants, especially as several of these are of gigantic size, and many others need naturally much space for exercise.

The *carnivora*, when bred and reared in dens of too small extent, begin to lose their muscular fulness of body, and what muscle remains becomes degenerated, and some members of their litters, reared in captivity, get affected with symptoms of paraplegia, with weakness in the buttocks and posterior limbs.

Proprietors of travelling menageries are in the habit of putting their *carnivora* and large animals through a series of *gymnastic performances*, which will be doubtless of as great benefit to their health as they are to the human species, and ought therefore to be introduced into our Zoological Gardens.

The *antelope* and *deer* tribes, being of nomadic disposition, should have much more space allotted to them than there is at present in the Gardens, where should be provided means for grazing and browsing in the open air, in full sunlight, and with free exposure to the winds, to ensure healthy digestion and complete aëration in the lungs.

In a city so well provided with water as London is, one must be surprised at the *scantiness of the supplies* afforded to some quadrupeds and birds, whereby what little exists very soon gets soiled and unfit for bathing and drinking purposes. These basins and ponds are seldom to be seen filled with aught else than ditch water, and are as dirty as horse ponds, whereas there might easily be designed and constructed a plan for a constant supply of fresh water to run in, and the foul water out, and thus ensure purity and cleanliness.